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PATENT SPECIFICATION

Inventor: SAMUEL JAMES EVERETT

737,676

Date of filing Complete Specification (under Section 3 (3) of the Patents Act, 1949): Nov. 13, 1953.

Application Date: Nov. 14, 1952. No. 28797/52.
Application Date: Jan. 2, 1953. No. 183/53.
Application Date: Jan. 22, 1953. No. 1938/53.

Complete Specification Published: Sept. 28, 1955.

Index at acceptance:—**Classes 81(2)**, B15C4; **83(2)**, A161; and **83(4)**, Q2A(3:4:14).

COMPLETE SPECIFICATION

Improvements relating to Hypodermic Needles

We, S. & R. J. EVERETT & COMPANY LIMITED, a British company, of 939, London Road, Thornton Heath, Surrey, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to hypodermic needles and is particularly concerned with the attachment of needles to the nozzles of hypodermic syringes.

Hypodermic needles should be held rigidly on the nozzle of a syringe so that an effective seal is formed between the nozzle and the mount provided on the needle to engage the nozzle. Various types of push-on and screw connections have been proposed, and the present invention provides an improved arrangement for securing a needle to the nozzle, including a simplified construction of the needle mount, and enabling the mount to be gripped easily and in such a way as to minimize the risk of contamination when fitting the needle to the syringe. The invention provides a readily engageable securing lock to hold the mount in tight sealing engagement with the nozzle.

According to the invention a hypodermic needle has a mount formed with a tapered bore to fit the nozzle of a hypodermic syringe and with a resilient detent for engaging a locking surface formed on the nozzle of the syringe and extending substantially radially from, and inclined at a small angle to a plane perpendicular to, the axis of the bore, the detent being shaped so as to yield when fitted in such a nozzle but having a locking face facing the point of the needle to prevent the mount being drawn off the nozzle when the detent is engaged with the locking surface. The mount may be stamped from sheet metal to form a tapered tubular body adapted to fit the syringe nozzle and an integral finger piece at the rear end of the body may be provided by stamping radial projections from the body. The body may be stamped from stainless steel, brass, or other suitable sheet or strip metal. The needle may be secured in the body by a tubular rivet swaged into the body and through which the needle passes.

In the accompanying drawings:—

Figure 1 shows one form of mount stamped from sheet metal;

Figure 2 shows the mount of Figure 1 partly in section on the line II—II in position on the nozzle of a syringe;

Figure 3 shows an under view of the mount in Figure 1, as seen from the left;

Figure 4 shows a turned mount according to the invention;

Figure 5 is a section of Figure 4 on the line V—V;

Figure 6 is a longitudinal section of a luer-lock type of syringe nozzle;

Figure 7 shows a mount according to the invention for use with the nozzle of Figure 6;

Figure 8 shows a view of the mount seen in Figure 7, as seen from the left.

Figure 9 shows a further form of stamped mount in position on a nozzle;

Figure 10 shows a view on the mount seen in Figure 9, from the left;

Figure 11 shows a plan view of the nozzle shown in Figure 9;

Figure 12 shows the mechanism by which the mount shown in Figures 1 to 3 is stamped from a metal strip, and

Figures 13 and 14 show the various stages in the formation of the mount from the strip.

Referring to Figures 1 to 3, the nozzle of the syringe is formed of case hardened stainless steel and consists of a tapered spigot 1 grooved at 2 to form a pair of quick start threads 3. The spigot has the usual bore to permit fluid in the syringe to pass into the needle.

The needle shaft 5 is secured in a stamped mount 6 by means of a tubular rivet 7 through which the shaft 5 passes, and which is swaged into the front end 8 of the mount 6. The

[*Price 3s. 0d.*]

body 9 of the mount 6 is tapered to fit the spigot 1 and at the rear end is flared out as shown to form an elliptical finger piece 10. At the ends of the minor axis of the ellipse the rear end of the mount is continuous with the tapered body 9 so as to lie close to the spigot 1 and at the rear end is flared out as one end of the minor axis, a detent 11 is pressed inwards, so as to have an edge 12 facing forwards. As will be seen in Figure 2, the detent offers little resistance when the mount is pushed on to the spigot 1, and rides easily over the threads 3, but the edge 12 prevents the detent being pulled directly off by engaging behind the threads 3, as shown in Figure 2. Thus, by twisting the mount in one direction it can be screwed on to the nozzle, and by twisting it in the other direction, it can be released from the nozzle.

The mount is made from flat stainless steel strip by the mechanism shown in Figure 12. The mechanism comprises upper and lower members 66, 67 respectively, which can be moved vertically relative to each other so as to bring the punches 15, 18, 21, 22, 23, 24, 25, 30, 32, 33, 34, 39, 40, into engagement with their respective dies 15A, 18A, 21A, 22A, 23A, 24A, 25A, 30A, 32A, 33A, 34A, 39A, 40A. All the punches and dies close together at the same time, and between each movement the strip 13 is advanced one stage. Figures 13 and 14 show the stages in the process. The strip 13 is fed into the mechanism from the right, as seen in Figure 12, and is first pierced with locating holes 14. The first punch 15 stamps out a disc 16 leaving it attached to the strip at two directly opposite points 17 only. The next punch 18 has a slightly larger diameter and stamps out a ring 19 to which the disc 16 is attached at 17, and leaves this ring attached to the strip 13 at 20 only. The strip now advances to the punch 21, which forms a cup 22B in the disc 16 reducing the overall diameter of the disc 16, and thus distorting the ring 19, as shown. This cup is successively elongated by punches 22, 23, 24, 25, as shown at 26, 27, 28, 29. The punch 30 begins the formation of the front end of reduced diameter 31, and this is continued by the punches 32, 33, 34, as shown at 35, 36, 37. The final shape as shown at 38, is imparted by the punch 39, and the punch 40 cuts the mount from the disc 16 and turns down the edges to form a finger piece, as shown at 41. The edges at the ends of the finger pieces are then pressed together the detent 11 formed, and the mount finished.

In Figures 4 and 5, the mount is turned from brass and comprises a body 42 with a tapered bore 43 leading to a bore 44 in which the needle is secured. The body 42 has diametrically opposite flats 45 to form finger pieces, and the rear end of the body 42 is formed with a collar 46 to reinforce it. Flats 47 are cut on this collar corresponding to the flats 45, and through one of these flats two saw cuts 48 are made parallel to the axis of the mount. The metal between these saw cuts forms a tab 49, and the rear end of this is shaped as shown at 50 into a wedge having a sloping face enabling it to pass over projections such as the threads 3 seen in Figure 2. The front face 51 is radial, however, and thus forms a resiliently mounted detent acting in the same way as the detent 11 in Figures 1 to 3.

Figure 6 shows a Luer-lock type of syringe nozzle comprising a spigot 52 having an internal bore 53 and tapered externally as at 54. The spigot is encircled by a sleeve 55 attached to the spigot by parts 56, and having a pair of internal threads 57. Figures 7 and 8 show a stamped mount similar to the mount shown in Figures 1 to 3 and made by a similar process, but arranged for use with the nozzle shown in Figure 6. The tapered stamped body 58 is flared at the rear end into a square section 59 as shown in Figure 8, and a detent 60 is pressed outwards at one corner. Thus, at the centre of each side of the square rear end, the body makes contact with the spigot 52 when the mount is fitted to the nozzle, but the detent 60 is held sufficiently far from the axis of the nozzle by the square shape of the rear end to engage one or other of the threads 57 on the sleeve 55. The square rear end, of course, affords a finger grip.

Figures 9 and 10 show a similar mount to Figures 7 and 8, but in which the detent 61 is pressed inwards from the centre of one side 62 of the square end of the mount 63, so as to be capable of engaging one of a pair of grooves 64, formed in the nozzle 65. As seen in Figure 11, each of the grooves 64 makes an angle of about 5 degrees with a plane perpendicular to the axis of the needle and nozzle.

What we claim is:—

1. A hypodermic needle having a mount formed with a tapered bore to fit the nozzle of a hypodermic syringe and with a resilient detent for engaging a locking surface formed on the nozzle of the syringe and extending substantially radially from, and inclined at a small angle to a plane perpendicular to, the axis of the bore, the detent being shaped so as to yield when fitted on such a nozzle, but having a locking face facing the point of the needle to prevent the mount being drawn off the nozzle when the detent is engaged with the locking surface.

2. A hypodermic needle according to claim 1, in which the mount comprises a tapered tubular body formed by stamping from sheet metal.

3. A hypodermic needle according to claim 2, in which the needle is secured in the body by a tubular rivet swaged into the body,

and through which the needle passes.

4. A hypodermic needle according to any one of claims 1 to 3, in which the detent is formed at the rear end of the mount.

5. A hypodermic needle according to claim 2 and claim 4, in which the detent is pressed from the rear end of the body.

6. A hypodermic needle according to any one of claims 2 to 5, in which the mount is flared out at the rear end at two diametrically opposite points to form finger pieces.

7. A hypodermic needle according to any one of claims 2 to 5, in which the mount is flared out at the rear end to a substantially square section, the corners of the square forming four projections acting as finger pieces.

8. A hypodermic needle according to claim 7, in which the detent is pressed outwards from the rear end of the body at one corner.

9. The combination of a hypodermic syringe having a tapered nozzle formed with one or more ribs or grooves having surfaces extending substantially radially and inclined at a small angle to a plane perpendicular to the axis of the syringe, and a needle according to claim 1 fixed in a mount having a bore tapered to fit the nozzle and a springy detent so shaped and in such a position that, when the needle mount is fitted on to the nozzle, it can pass into engagement with a rib or groove to prevent the mount being pulled directly off the nozzle, the inclination of the rib or groove engaging the detent enabling the mount to be drawn into tight engagement with the nozzle by turning the mount about the axis of the needle relatively to the nozzle.

10. The combination of syringe and needle according to claim 9, in which the nozzle of the syringe is formed of case hardened stainless steel.

11. The combination of syringe and needle according to claim 9 or claim 10 in which the mount has a tubular body from which the detent is bent.

12. The combination of syringe and needle according to any one of claims 9 to 11, in which the mount comprises a tapered body stamped from sheet metal.

13. The combination of syringe and needle according to any one of claims 9 to 12, in which the nozzle of the syringe comprises an inner spigot, tapered to take the needle mount, and a sleeve surrounding the spigot and spaced from it sufficiently to admit the needle mount, ribs or grooves being formed on the bore of the sleeve and the detent being arranged to project outwards from the mount.

14. The combination of syringe and needle according to claim 12, in which the needle is secured in the tubular body by a tubular rivet swaged into the body and through which the needle runs.

15. The combination of syringe and needle according to claim 12 or claim 14, in which the body is flared out at the rear end at two diametrically opposite points to form a finger piece.

16. The combination of syringe and needle according to claim 12 or claim 14, in which the mount is flared out at the rear end to a substantially square section, the corners of the square forming four projections acting as finger pieces.

17. The combination of syringe and needle according to claim 13 and claim 16, in which, to engage with ridges or grooves formed on the sleeve, the rear end of the mount has a square section and a detent is pressed outwards from the rear end at one corner.

18. A hypodermic needle having a mount according to claim 1, substantially as described with reference to the accompanying drawings.

19. The combination of syringe and needle according to claim 9, substantially as described with reference to the accompanying drawings.

For the Applicants:—
GILL, JENNINGS & EVERY,
Chartered Patent Agents,
51/52, Chancery Lane, London, W.C.2.

PROVISIONAL SPECIFICATION
No. 28787 A.D. 1952

Improvements relating to Hypodermic Needles

We, S. & R. J. EVERETT & COMPANY LIMITED, a British company, 939, London Road, Thornton Heath, in the County of Surrey, do hereby declare this invention to be described in the following statement:—

This invention relates to hypodermic needles, and is concerned with the mounting provided on such needles for attaching them to the nozzle of a hypodermic syringe.

These mounts normally take the form of an open-ended socket from the closed end of which the nozzle projects. The usual methods of making these sockets are to turn them in a lathe, by die-casting metal, or injection moulded plastic, or to make them integral with the needle itself by stamping the whole from stainless steel sheet. It is desirable that the socket part of the mount should be able to conform closely to the shape of the nozzle, so that a close fit is obtained and leakage avoided. The mounts produced by the first two methods mentioned have not sufficient flexibility to ensure this and it is the object of the present invention to provide a flexible needle

mount which can be made cheaply and easily independently of the needle and which has the desirable degree of flexibility and can be securely attached to the needle shaft.

According to the invention the mount consists of a tubular body stamped from suitable sheet metal and having a tubular rivet within the body through which the needle shaft passes and which is swaged to cause the rivet to grip the needle shaft tightly. Conveniently, the rivet may be arranged inside a truncated part of the needle mount which is caused to grip the rivet by the swaging operation. Alternatively, the rivet may be peened over at its end to cause it to grip both the needle and the mount. The central hole in the stamping may be punched out leaving a jagged edge which ensures a good grip on the rivet.

Preferably, the stamping is of stainless steel or brass, although aluminium, which does not withstand repeated sterilization by certain sterilizing processes, can be used for needles which are only intended for single injections. The rivet may be of soft metal, such as copper or soft brass, but preferably takes the form of a tin alloy die-casting.

The tubular stamping can be shaped so as to fit the nozzle snugly for about half its length, the rear end of the stamping being flaired out away from the nozzle around from $\frac{1}{3}$ to $\frac{1}{2}$ of its periphery, so that the part which is not flaired out acts as a spring grip on the nozzle and the flaired out part forms a finger piece enabling the mount to be more easily gripped by the user. The flaired part of the mount may be two, three, or four-sided, the flat sides sloping so as to conform substantially to the taper of the nozzle.

Moreover, one or more small detents may be pierced or punched inwards on the flaired part of the stamping where it fits closely to the nozzle, the detents preferably being shaped so as to point towards the point of the needle so as to engage a cam face or faces formed on the nozzle of the syringe having a profile such that the detents will spring over the cam faces when the needle is fitted on the nozzle due to the springiness of the stamped mount and will then engage with the cam faces by twisting the needle to hold the mount securely on the nozzle. Preferably, one detent is formed in the mount, and four such cam faces are formed on the nozzle.

The flaired part of the stamping can be made helical, so that when the mount is turned to lock it on the nozzle, the finger pressure on the spiral will tend to force the mount further on and, of course, the reverse effect will be obtained when the needle is twisted back to remove it.

For the Applicants:—
GILL, JENNINGS & EVERY,
Chartered Patent Agents,
51/52, Chancery Lane, London, W.C.2.

PROVISIONAL SPECIFICATION
No. 183 A.D. 1953

Improvements relating to Hypodermic Needles

We, S. & R. J. EVERETT & COMPANY LIMITED, a British Company, of 939, London Road, Thornton Heath, in the County of Surrey, do hereby declare this invention to be described in the following statement:—

This invention relates to hypodermic needles, and is cognate with or a modification of the invention described in our co-pending application No. 28797/52.

In that specification, the mount for a hypodermic needle is described which consists of a tubular body stamped from suitable sheet metal, and having a tubular rivet within the body through which the needle shaft passes and which is swaged to cause the rivet to grip the needle shaft tightly. The body can be shaped so that it flairs out on each side of the part which is shaped to grip the nozzle of a hypodermic syringe, providing a finger grip and so that only part of this part of the body is in contact with the nozzle circumferentially, although the part in contact is sufficient to ensure that the needle is held rigidly.

The stamping of needle mounts in this way, enables a substantial economy to be effected in the manufacture of the needles. For one thing less metal is used and also stamping is a much faster and less expensive operation than turning needle mounts on automatic lathes which require a good deal more mechanical attention and periodic repair.

The present invention provides an alternative arrangement for ensuring a finger grip, and, at the same time, ensuring that the mount and needle are firmly locked to the syringe nozzle.

According to the invention, a tubular body is stamped from suitable sheet metal with a tubular rivet within the body through which the needle shaft passes and which is swaged to cause the rivet to grip the needle shaft tightly, and near the edge of the mount remote from the point of the needle, the body of the mount is cut through for a short distance away from the edge in a direction substantially normal to that edge, and then in a

direction parallel to that edge so as to form a tab or lug which can be bent inwards somewhat. A corresponding cam face is provided on the syringe nozzle forming a ridge or groove over which the tab or lug springs when the mount is pushed onto the nozzle, or the mount may be pushed onto the nozzle and the mount then turned until the tab or lug engages the cam face, thus locking the mount in position. Alternatively, the tab or lug may project outwards to engage the inner surface of the external socket or sleeve of a Luer-lock type of syringe.

To grip such a needle mount, it is provided with a stamping having a central hole capable of fitting over the small end of the body of the mount from which the needle projects. The stamping comprises the pierced central piece from which ears extend which can be bent to form finger pieces arranged adjacent to, but not touching the stamped mount. This stamping is fitted over the body of the mount before the tubular rivet, carrying the needle, is riveted into position. The act of riveting then causes the rivet to close and grip the needle and expand outwards so as to make tight contact with the stamped body which is also caused to expand by this process into tight and rigid contact with the eared stamping. The result is a complete assembly of needle and mount with gripping ears and a spring clip for locking on the syringe nozzle. The ears may also be bent so as to lie helically relative to the needle mount, so that the needle is forced onto the mount when turned in one direction, and off the mount when turned in the opposite direction.

In one example according to the invention, the spring clip is formed at the open end of the mount by a short cut about 1/16 of an inch long, parallel to the axis of the needle, and a circumferential cut joining the base of the first cut and also about 1/16 of an inch long.

In another example, the stamping is square in section and two sockets at right angles are made in the centre of one of the faces some distance in from the edge of the mount. The tab so formed is bent inwards to engage a helical groove machined on the socket. Alternatively, with a square section stamping, the tab is formed by two parallel axial cuts at one corner, bent outwards so that they may engage the helical ridge formed on the inner surface of the sleeve of a Luer-lock type of nozzle.

The resilient character of the inwardly or outwardly turned projections enables them to spring over the cam surfaces with which they engage and thereafter hold the needle firmly until it is removed by rotating the mount relative to the syringe socket.

For the Applicants:—
GILL, JENNINGS & EVERY,
Chartered Patent Agents,
51/52, Chancery Lane, London, W.C.2.

PROVISIONAL SPECIFICATION
No. 1938 A.D. 1953

Improvements relating to Hypodermic Needles

We, S. & R. J. EVERETT & COMPANY LIMITED, a British Company, of 939, London Road, Thornton Heath, in the County of Surrey, do hereby declare this invention to be described in the following statement:—

This invention relates to hypodermic needles, and is particularly concerned with the attachment of the needles to the nozzles of hypodermic syringes.

It is desirable that the needle should be held rigidly on the nozzle of a syringe and in such a way that an effective seal is formed between the nozzle and the mount which is provided to engage the nozzle so that the fluid does not leak out through the joint. Various types of push-on and screw connections have been proposed, and the present invention provides an improved locking arrangement for holding the mount securely on the nozzle while ensuring that the minimum of manipulation is required in fitting the needle to the syringe so that the danger of contaminating the needle is minimized.

According to the invention, the nozzle of the syringe is provided with an effectively helical cam surface, and the needle mount is formed with a resilient detent shaped so that it can pass over the cam surface when the needle is fitted on the syringe but engages the cam surface to prevent the needle being pulled directly off the mount, the helical nature of the cam surface enabling the mount to be drawn tightly onto the nozzle by twisting the needle slightly.

In one example of a needle lock according to the invention, a pair of parallel slots are cut axially close together from the rear end down one side of an otherwise conventional standard mount for fitting on a plane tapered nozzle. The rearwardly extending tab left between the two cuts is reduced in thickness and stamped so that a forward facing radial projection is formed on its inner face, the rear face of this projection being sloped, so that, when the mount is fitted on the nozzle of a syringe, the tab is urged outwards. The

nozzle of a syringe may be formed with a short helical thread-like ridge, or several ridges spaced angularly round the nozzle so that one is available to be engaged by the projection of the detent no matter what the orientation of the mount. Due to the resilience of the thinned down part of the detent, the detent springs over the thread-like ridge but cannot be withdrawn without an unscrewing action, and the mount can be securely held on the nozzle by twisting it in the opposite direction so that the detent is screwed-up by the thread.

Instead of a thread projecting from the surface of the nozzle, a pair of straight circumferential slots may be milled at diametrically opposite points on the tapered part of the nozzle at a position where the detent will spring into one or other of them when the needle mount is pushed fully home on the nozzle. The slots are set at a slight angle to the truly circumferential tangent at the point where they are cut so that they act as short screw threads.

Instead of the mount being made from solid brass or other suitable metal, it may be made as a stamping with the needle passing through a tubular rivet in the nose of the stamping which rivet is expanded by swaging to engage the walls of the stamping and hold the needle rigidly. The stamping is cut from thin metal and the detent is formed conveniently by making two cuts at right angles and pressing the resulting triangular tab inwards when it will engage either of the forms of nozzle described exactly in the same way as the detent formed from the solid turned mount.

With the Luer-lock type of nozzle, the nozzle has a plain taper but is surrounded by a sleeve on the inner face of which a helical thread-like ridge is formed, the needle mount being inserted into the annular space between the nozzle and sleeve. The turned mount already described may be adapted for use with such a sleeve according to the invention, by forming the radial projection of the detent on the outer face instead of on the inner face of the tab. When a stamped mount is used, the rear mount is made of rectangular section so as to make tangential contact with the tapering nozzle only at the centre of the sides of the rectangular, and the detent is formed by making two cuts at one of the corners of the rectangular part, the diagonal dimension of which is such that the rectangular part fits within the sleeve and the detent springs into engagement with the thread-like ridge.

For the Applicants:—
GILL, JENNINGS & EVERY,
Chartered Patent Agents,
51/52, Chancery Lane, London, W.C.2.

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737,676 COMPLETE SPECIFICATION
2 SHEETS

This drawing is a reproduction of the Original on a reduced scale.
SHEET 1

FIG.1.

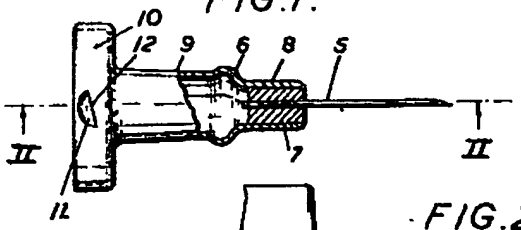


FIG.2.

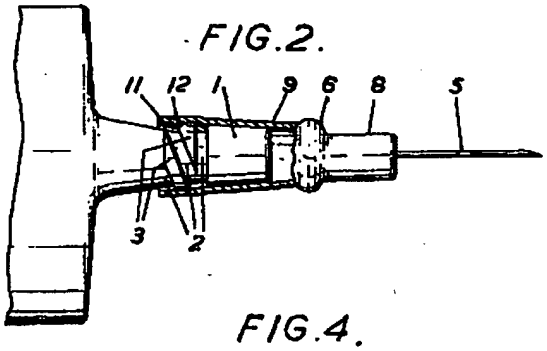


FIG.3.

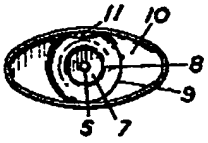


FIG.4.

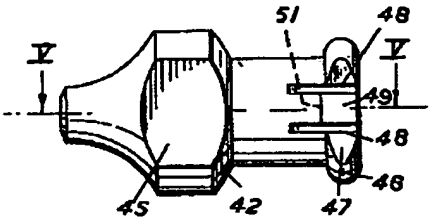


FIG.5.

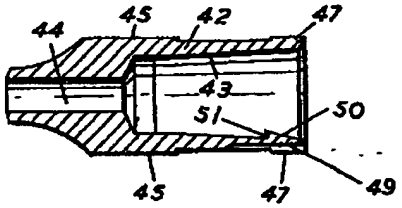


FIG.6.

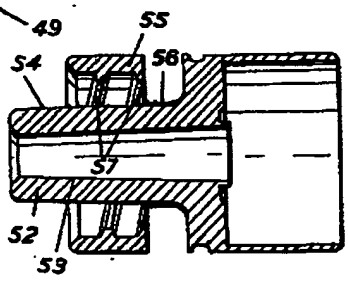
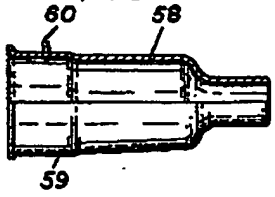


FIG. 7.



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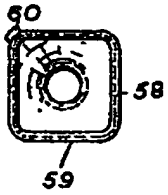


FIG. 9.

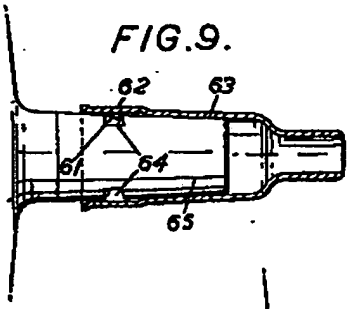
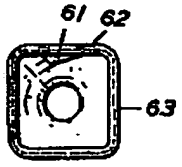


FIG. 10.



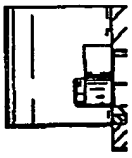
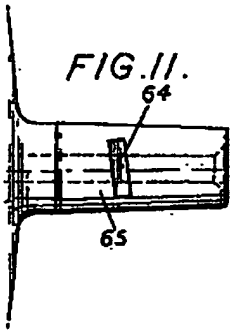


FIG. 11.



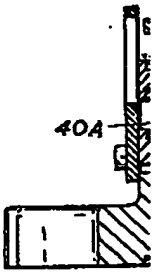


FIG. 13.

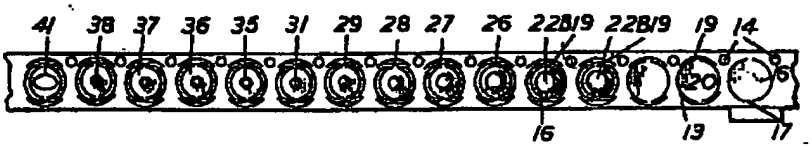
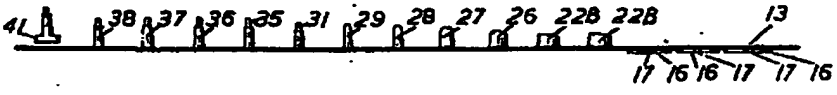


FIG. 14.



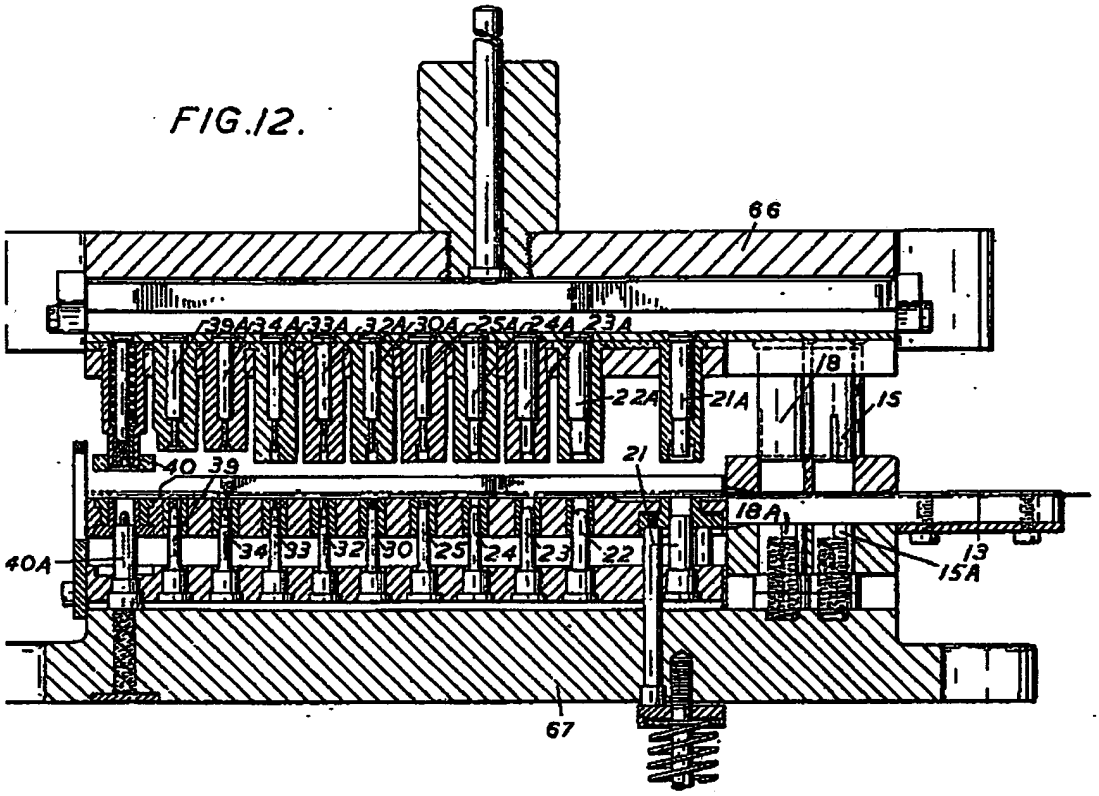
737,676 COMPLETE SPECIFICATION

2 SHEETS

This drawing is a reproduction of the Original on a reduced scale.

SHEET 2

FIG.12.



737,676 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEET 2

FIG.7.

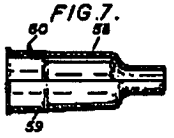


FIG.8.

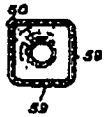


FIG.9.

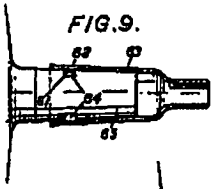


FIG.10.

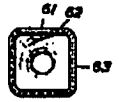


FIG.11.

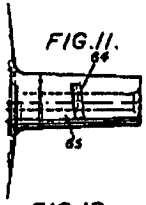


FIG.12.

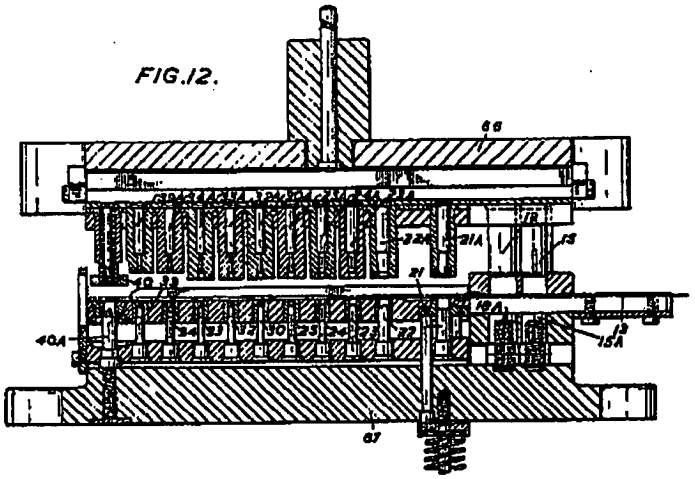


FIG.13.

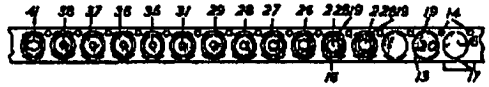


FIG.14.